

REMARKS

This Amendment is submitted in response to the non-final Office Action mailed on May 3, 2010. No fee is due in connection with this Amendment. The Director is authorized to charge any additional fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 3712174-00608 on the account statement.

Claims 8 and 10-24 are pending in this application. Claims 1-7 and 9 were previously canceled without prejudice or disclaimer. In the Office Action, Claims 19-20 and 23-24 are rejected under 35 U.S.C. §112. Claims 8, 11, 14 and 18 are rejected under 35 U.S.C. §102. Claims 8 and 10-24 are rejected under 35 U.S.C. §103. In response, Claims 8, 14, 19-20 and 23-24 have been amended, and Claims 25-26 have been newly added. The amendments do not add new matter. The new claims do not add new matter. At least in view of the amendments and/or for the reasons set forth below, Applicants respectfully submit that the rejections should be withdrawn.

In the Office Action, Claims 19-20 and 23-24 are rejected under 35 U.S.C. §112, first paragraph, for failure to comply with the written description requirement. The Patent Office asserts that the Specification fails to provide support for the limitation of the claimed “dry” volume ratio. See, Office Action, page 3, lines 1-9. Specifically, the Patent Office asserts that the only dry volume ratio of water-insoluble polymer to stimuli-responsive monomer given in the examples is 40:100 (0.4 mL of water-insoluble polymer and 1 mL of stimuli-responsive monomer), which is not within the claimed range. See, Office Action, page 3, lines 9-21. In response, Applicants have amended the Specification and Claims 19-20 and 23-24 to clarify that “the dry volume ratio of the monomer having a stimuli-responsive functional group to the water-insoluble polymer is” within the claimed ranges. The amendments do not add new matter. The amendments are supported in the Specification at, for example, page 2, paragraph 27; page 3, paragraph 45; page 4, paragraphs 59-60 and 66-67; page 5, paragraphs 73-74. Applicants further note that the examples all recite the “*dry* volume” of water-insoluble polymer. See, Specification, page 4, paragraphs 59-60 and 66-67; page 5, paragraphs 73-74. As such, Applicants respectfully submit that the claims are adequately supported by the Specification.

Accordingly, Applicants respectfully request that the rejection of Claims 19-20 and 23-24 under 35 U.S.C. §112, first paragraph, be withdrawn.

In the Office Action, Claims 8, 11, 14 and 18 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Publication No. 2002/0001571 A1 to Wu et al. ("*Wu*"). In response, Applicants have amended Claims 8 and 14. In view of the amendments and/or for at least the reasons set forth below, Applicants respectfully submit that *Wu* fails to disclose each and every element of independent Claims 8 and 14 and Claims 11 and 18 that depend therefrom.

Independent Claims 8 and 14 recite, in part, a stimuli-responsive polymer hydrogel comprising: a water-insoluble polymer as a phase separation structure formed within the hydrogel, wherein the water-insoluble polymer is a polymer without a cross-linking point; and a stimuli-responsive polymer, wherein the polymer hydrogel is capable of gelating as a result of absorbing and swelling with water and capable of changing its degree of swelling and/or volume in response to a stimulus. The amendments do not add new matter. The amendments are supported in the Specification at, for example, page 1, paragraphs 17-18; pages 1-2, paragraph 19; page 2, paragraphs 20 and 25-28; page 3, paragraphs 39, 43 and 46; page 4, paragraphs 62 and 69; page 5, paragraph 77. By incorporating a water-insoluble polymer that does not have a cross-linking point as a reinforcer within the hydrogel, the breaking strength of the hydrogel can be improved without the reinforcer dissolving out of the gel. See, Specification, page 2, paragraphs 20 and 26-28. In contrast, *Wu* fails to disclose every element of the present claims.

For example, *Wu* fails to disclose or suggest a water-insoluble polymer formed within the hydrogel as required, in part, by independent Claims 8 and 14. The Patent Office asserts that *Wu* teaches a second hydrophobic polymer which is incorporated into a stimuli-responsive polymer and acts as a matrix for the stimuli-responsive polymer. See, Office Action, page 4, lines 1-5; page 6, lines 17-20; Office Action dated March 20, 2009, page 3, lines 12-17. However, contrary to the Patent Office's assertion, *Wu* merely discloses a composite polymer system in which already polymerized stimuli-responsive particles are mixed with a second, hydrophobic, polymer to form a composite membrane. See, *Wu*, pages 1-2, paragraph 11; page 2, paragraphs 12-13, 16-20 and 23; page 3, paragraph 41. For example, *Wu* teaches that its stimuli-responsive polymer nanoparticles are either dispersed in a solution of the second polymer and dried or melted with the second polymer to form a composite membrane. See, *Wu*, page 3, paragraph 41; page 4, paragraph 54. Nowhere does *Wu* disclose or suggest that the second polymer is incorporated into or formed within the stimuli-responsive polymer.

In fact, because the stimuli-responsive polymer is already polymerized and formed into nanoparticles before mixing with the second polymer, Applicants respectfully submit that one of ordinary skill in the art would understand that the second polymer of *Wu* cannot be formed within the stimuli-responsive polymer. In contrast, the present Specification teaches that the stimuli-responsive monomer is mixed with the water-insoluble polymer and a polymerization initiator and then polymerized in a solution of the water-insoluble polymer to form a stimuli-responsive polymer hydrogel containing the water-insoluble polymer within the hydrogel as a reinforcer. See, Specification, page 2, paragraphs 23-24; page 4, paragraphs 59-62 and 66-69; page 5, paragraphs 73-76. Thus, contrary to the Patent Office's assertion, *Wu* fails to disclose a water-insoluble polymer formed within the hydrogel in accordance with the present claims.

Moreover, *Wu* fails to disclose or suggest a stimuli-responsive polymer hydrogel, wherein the water-insoluble polymer is a polymer without a cross-linking point as required, in part, by independent Claims 8 and 14. The Patent Office asserts that *Wu* disparages existing membranes prepared by cross-linking and "teaches that the stimuli-responsive particles are dispersed in a polymer which is poured into a mold and allowed to dry or melted and cooled. . . . This is not a crosslinking process." See, Office Action dated October 29, 2009, page 3, lines 16-21. However, even if *Wu* discloses that its polymer is not cross-linked, Applicants respectfully submit that this does not necessarily mean its hydrophobic polymer is without a cross-linking point such that it cannot be cross-linked when mixed with a cross-linker. One of ordinary skill in the art would understand that the phrase "without a cross-linking point" is a physical property of the polymer, rather than a process limitation which means that the polymer is not cross-linked. For example, the present Specification teaches that the stimuli-responsive monomer is mixed with the water-insoluble polymer in the presence of a cross-linker and then polymerized to form a stimuli-responsive polymer hydrogel. See, Specification, page 4, paragraphs 59-62 and 66-69; page 5, paragraphs 73-76. Because the water-insoluble polymer does not have a cross-linking point, the hydrogel can be formed in the presence of a cross-linker without also cross-linking the water-insoluble polymer, thereby improving the breaking strength of the hydrogel. See, Specification, page 3, paragraph 40; page 4, paragraphs 59-62 and 66-69; page 5, paragraphs 73-76. Nowhere does *Wu* teach that its hydrophobic polymer is without a cross-linking point.

Accordingly, Applicants respectfully request that the rejection of Claims 8, 11, 14 and 18 under 35 U.S.C. §102(b) to *Wu* be withdrawn.

In the Office Action, Claims 8 and 10-24 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,331,578 B1 to Turner (“*Turner*”). For at least the reasons set forth below, Applicants respectfully submit that *Turner* fails to disclose or render obvious each and every element of the present claims.

For example, *Turner* fails to disclose or suggest a stimuli-responsive polymer hydrogel comprising a water-insoluble polymer, wherein the water-insoluble polymer is a polymer without a cross-linking point as required, in part, by independent Claims 8 and 14. The Patent Office asserts that *Turner* discloses a hydrophilic-hydrophobic IPN membrane having a uniform composition, where the hydrophobic polymer is the host polymer network. See, Office Action, page 7, lines 4-11. The Patent Office further asserts that because *Turner* teaches polystyrene as a hydrophobic host network, which is one of the water-insoluble polymers disclosed in the present Specification, that the polystyrene necessarily cannot have a cross-linking point. See, Office Action, page 7, lines 11-15. However, contrary to the Patent Office’s assertion, *Turner* itself expressly teaches that its hydrophobic polymer may be cross-linked. See, *Turner*, column 9, lines 27-29 and 39-67; column 10, lines 1-10. In fact, *Turner* states that: “In the preferred embodiment both or all polymeric components are crosslinked. . . . The host polymer network may be chosen from suitable hydrophobic polymers that may include. . . polystyrene (PS).” See, *Turner*, column 9, lines 27-29 and 42-48. As such, one of ordinary skill in the art would understand that polystyrene may be cross-linked depending on its physical properties. Therefore, merely because *Turner* discloses polystyrene does not mean *Turner* necessarily discloses polystyrene without a cross-linking point.

The Patent Office further asserts that *Turner* teaches semi-IPNs in which one or more of the polymer components remains linear and that it would have been obvious to one of ordinary skill in the art to employ the hydrophobic component as the linear component. See, Office Action, page 7, lines 7-9 and 16-22. However, nowhere does *Turner* teach that its hydrophobic/hydrophilic networks may be employed in semi-IPNs such that one of the hydrophilic/hydrophobic polymer components remains linear. Instead, the Patent Office pieces together two very distinct portions of *Turner*: one which teaches a bicontinuous, hydrophilic-hydrophobic IPN membrane and another which teaches semi-IPNs. See, *Turner*, column 9, lines 12-31. As such, one of ordinary skill in the art would have no reason to combine *Turner*’s teaching of semi-IPNs with its teaching of hydrophilic-hydrophobic IPNs.

For similar reasons, Applicants respectfully submit that *Turner* fails to disclose polymerizing a monomer having a stimuli-responsive functional group with a crosslinker in a solution of a water-insoluble polymer, wherein the water-insoluble polymer is a polymer without a cross-linking point as required, in part, by Claims 12-13.

Accordingly, Applicants respectfully request that the rejection of Claims 8 and 10-24 under 35 U.S.C. §103(a) to *Turner* be withdrawn.


Applicants further note that Claims 25-26 have been newly added. The new Claims are fully supported in the Specification at, for example, page 3, paragraph 39; page 4, paragraphs 59 and 66; page 5, paragraph 73. No new matter has been added thereby. Applicants respectfully submit that the subject matter as defined in the newly added claims is patentable over the cited art for at least substantially the same reasons discussed above.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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